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banding of some of the schists is due to interlaminations of igneous rocks of different characters.

Several new occurrences of alnoite are described by Smyth[8] from near Manheim, N. Y. The rock of a small dyke does not differ in any essential respect from the rocks described a few years ago. The rock of a large dyke is very fine grained on the margin of the dyke, but in its interior it is a coarse grained panidiomorphic aggregate of reddish-brown mica and serpentine pseudomorphs after olivine, together with a little magnetite, apatite and perofskite. Melilite has not been observed in the rock, but the author thinks that it may have been present before alteration set in.

In the report on the the Mine la Motte sheet of the Missouri Geological Survey, Keyes and Haworth[9] describe the Archean rocks found within the district as granites which pass upwards into prophyries. Some of the granites are granular, while others are porphyrtic. In composition they are normal. The porphyries are like those of the Iron Mountain district. The acid rocks are cut by intrusions of diabase, and of quartz disabase porphyrites.

In a collection of rocks from the Provinces Kansu, Schensi, Hupe and Honan, in China, Steuer[10] finds granites, hornblende-vogesite, melaphyre, serpentine, amphibolite, gneiss, and various schists and sediments.

GEOLOGY AND PALEONTOLOGY.

Lambdotherium not Related to Palæosyops or the Titanotheres.—The little species *Lambdotherium popoagicum* of the Wind River beds, found contemporary with *Palæosyops borealis,* has been treated by Cope, Earle and others as an ancestral titanothere. A more careful examination of the numerous specimens in the American Museum shows at once that it bears much closer resemblances to the horses, especially in the chisel-shaped incisors, the atlas, the manus and pes.

A restatement of its definition and principal characters appears to be of value.

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[8] Amer. Jour. Sci., 1896, Vol. II, p. 290.

[9] Missouri Geol. Survey, Sheet Report, No. 4. p. 24.

[10] Neues Jahrb. f. Min., etc., 1896, II, p. 477.

GEN. LAMBDOTHERIUM Cope. Incisors chisel-shaped. Premolars relatively reduced, a wide diastema in front of p$\frac{1}{1}$. Superior molars bunoselenodont with an oblique ectoloph, including a very prominent parastyle and sharply defined mesostyle; protoloph with a sharply defined protoconule. Manus with the fourth digit reduced, functionally tridactyl with lunar widely displaced.

L. POPOAGICUS Cope.[1] This species was established upon two mandibular rami with the anterior and posterior portions fractured (Am. Mus. Cope Coll., 4863). The animal is small (pm2–m3=.069), ranging in size between the largest Hyracotheres and smallest species of Palæosyops (*P. brownianus*). Remains of twenty individuals are now contained in the American Museum, Cope Collection. The number of incisors is unknown and it is also uncertain whether there are three or four premolars. The incisors are chisel-shaped. The canines are sharply pointed. The second and third upper premolars have single internal lobes. The form of the molars is very characteristic; they differ from the contemporary Hyrachothere molars in the obliquity of the ectoloph, the prominent parastyle and sharply defined mesostyle, the protoconule is acutely triangular, while the metaconule is not defined but merged in the low metaloph; in fact, the inner half of the crown is quite like that of the early horses. In the lower jaw P_2 is a laterally compressed protocone, P_3 has rudiments of additional cusps, P_4 is submolariform with its tetartocone rudimentary or absent.

The lambdoidal lower molar crests give the name to the genus; the the paraconid (as in the Hyracothere) is feebly reduplicate; in M_3 the hypoconulid varies from a conic to a selenoid or crested form. The few skeletal characters known are very significant (See Am. Mus., Cope Coll., No. 4880). As in the Equidæ the vertebrarterial canal passes through the upper side of the transversal process of the atlas. The displacement in the manus is extreme, the lunar resting on the unciform and demonstrating that although four toes existed the foot was mesaxonic; at the same time the median digit was not greatly enlarged, indicating that the foot was of an iso-tridactyl type. The pes exhibited a deeply grooved astragalus, judging from the tibial articulation. A doubtfully associated astragalus (No. 4904) shows widely separated inferior and sustentacular facets as in the horses.

Remains of the tibia, of the calcaneum and other characteristic limb bones all resemble the corresponding parts in the contemporary Equidæ.

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[1] Am. Nat., 1880, p. 748, Tert. Vert., p.

This animal differs, however, from the contemporary horses in the prominent median cusps (mesostyle) of the superior molars, and the asymmetry of the outer wall (ectoloph) caused by the prominent parastyle. This forbids our placing it with the true line of horses. The molars and the pes resemble those of the imperfectly known *Triplopus amarorum* a species whose relations to *Triplopus* the writer has always doubted.

It appears possible that we have here another side line of perissodactyls, related to the horses.—HENRY F. OSBORN.

Development of the Foot in the Palæosyopinæ.—The following observations are based on the specimens contained in the collections of the American Museum of Natural History of New York.

The Lower Eocene member of the group, *Palæosyops borealis* Cope, was rather slenderly built, with comparatively long toes, well separated. With the great increase in size in the Middle and Upper Eocene came a corresponding change in foot structure. Two types developed, one with short broad foot, the toe bones short, stout and widely spreading; the other with longer and rather stilted foot, the metapodials long, but set close together. The former type is that of Palæosyops, and is correlated with a short wide head and general stout heavy build. The latter is the Telmatotherium type, and is associated with long heads and probably much more slender form. The species can be conveniently distinguished by two characters in the astragalus, viz., the length and thickness of the neck, and the shape and relations of the sustentacular facet.

In an astragalus referred to *P. borealis*, the neck is moderately long and not thickened at the base. The sustentacular is a rather long oval, and scarcely separated from the distal (cuboid and navicular) facets. In our specimens of *P. laticeps* Marsh, the characters are much the same as the above. *P. paludosus* Leidy, and *P. ultimus*[2] Osborn, have a broad, short-necked astragalus, the sustentacular facet, in the former species at least, being short-oval and generally (but not always) well separated from the distal facets.[3] The other (Telmatotherid) line shows a slight lengthening and considerable thickening of the neck, and a change in the shape of the sustentacular facet, either to an extremely long oval, separate from the distal facets, as seen in a specimen referred to *T. hyognathum* Scott & Osborn, or else a long

[2] Species not yet described.

[3] It is not so, apparently, in the Princeton specimen described by Earle in his Memoir on Palæosyops.

triangular shape, confluent at its base with the distal facets, as seen in *T. cornutum* Osborn, of the lower Uinta. In the small species *T. megarhinum* Earle, the primitive type persists through to the Lower Uinta, with some lengthening of the neck of the astragalus and of the sustentacular oval. A Bridger specimen of *T. cultridens* is more advanced, being intermediate between *megarhinum* and the supposed *hyognathum*. *Diplacodon* in the Upper Uinta, shows a short neck, but the facet was long elliptical, tending towards confluency; it appears more nearly allied to the persistent primitive forms than to either extreme type, as shown in *T. cornutum* on the one hand and *P. paludosus* on the other. These characters of the foot-structure appear to be mainly dependent on the size of the animal and are, therefore, of little taxonomic value; but there appears to be a valid distinction between the long-footed Telmatotheres and the short-footed Palæosyops, which may serve as a further reason for separating the two genera. It must be remembered, however, that intermediate forms were abundant, and gave rise, probably, to the later Titanotheres.

In all but two of the above mentioned species the foot material is associated with skulls more or less complete. The determinations of the latter are on the authority of Osborn and Earle, and they will be fully described by Prof. Osborn in a forthcoming paper, this note, by his kind permission, being published in advance.—W. D. MATTHEWS.

The Western American Lœss.—In a paper read before the Iowa Academy of Sciences Mr. B. Shimek states that his investigations concerning the deposition of the Lœss of Iowa have convinced him that the theory of the lacustrine origin of the deposit and its origin in violent fluviatile floods are equally untenable. He offers instead the theory that the lœss is of æolian origin, and that it was deposited principally in forests and to a lesser extent in dense growths of smaller plants, while proportionately small quantities only were carried directly into the waters and there deposited.

The author adduces the following facts to show that the lœss is not of aquatic origin:

"First.—The land area during the period of the formation of the lœss was large as is shown by the remains of great numbers of terrestrial mollusks."

"Second.—The occurrence of dry region mollusks, many of which species are now living throughout Iowa and eastern Nebraska, particularly in wooded regions."

"Third.—The deposits often occur so high above the surrounding region that it is difficult to conceive of the manner in which water laden with the fine silt could reach the place of deposition."

"Fourth.—The siliceous and other particles which the lœss contains are generally angular and often show a freshness of fractures which would scarcely appear in particles which had been rolled and washed about by the waters."

"Fifth.—The distribution of the lœss is better accounted for by the consideration of the action of the winds, and by the distribution of the forest areas."

Mr. Shimek adduces evidence demonstrating (1) that the lœss was deposited under climatic conditions essentially the same as those which prevail in the same region to-day; and (2) that the deposition was slow and continued through a period of considerable extent; and (3) that a forest lying adjacent or near to drift covered plains is especially favorable to the deposition of lœss.

The differences between the lœss of eastern and western Iowa are in accordance with the general topographical and climatic differences which probably existed during the lœss period, as they do now.

In considering the time element the author estimates the deposition to go on at the rate (minimum) of one mm. a year. If this be correct the time required for the formation of the entire deposit would not be unreasonably great. (Proceeds. Iowa Acad. Sciences [1895], 1896.)

The Extinct Birds of Chatham Island.—The Tring Museum is in possession of an immense collection of bird remains from the Chatham Islands, consisting of many thousands of bones. The collection is being worked up by Mr. C. A. Andrews, and the results published in Novitates Zoologicæ. From so large a mass of material Mr. Andrews was able to obtain nearly complete skeletons of several of the extinct species, and to form a tolerably accurate idea of the degree of individual variation in some of them. The first paper on the subject appears in the March number (1896) of the publication above mentioned. It comprises a detailed description of the osteology of Diaphorapteryx, prefaced by a brief explanation of the adoption of the generic name. In closing he calls attention to its close resemblance to Aphanapteryx, and discusses Milne-Edwards' statement that the similarity of the two forms is a strong evidence that the islands in which they occur, viz., Mauritius and Chatham were formerly connected with the great Antarctic Continent. The author is inclined toward Dr.

Gadow's explanation that the likeness of the two forms is the result of parallism in evolution.

The ancestors in the two cases, generalized rails capable of flight, were probably of different genera, or, at least, of different species.

A second paper (Sept., 1896) gives the osteology of *Palæolimnas chathamensis* and *Nesolimnas* (gen. nov.) *dieffenbachii.*

The proportions of Palæolimnas, together with the considerable size of the sternal keel and the deep impression of the insertion of the *Pectoralis major* on the crest of the humerus leads the author to state that "it seems probable that Palæolimnas may have still been capable of heavy flight for short distances."

Of Nesolimnas, the new genus, Mr. Andrews remarks as follows:

"In Nesolimnas we have an annectant form linking the flying to the flightless rails. In its plumage, in the condition of its sternum, and in many other points, it reminds us of Hyopotænidia; while on the other hand, in the reduction of its wings and the consequent modification of its hind limb it approaches Ocydromus. The existence of such an intermediate type seems to give strong support to the opinion that the Ocydromine rails have originated from forms capable of flight at a comparatively recent date and in the islands they now inhabit."

Both papers are profusely illustrated.

BOTANY.[1]

Climatic Influence of Lake Erie on Vegetation.—In a small district in northern Ohio, including Erie County, Sandusky Bay and the peninsula that bounds it on the north, with the islands of the Put-in-Bay group, there are growing wild 103 species and varieties of phanerogams, which so far as known have not been found anywhere in Michigan, 118 not found in Canada, and 233 not within fifty miles of the city of Buffalo, at the east end of the lake.

Lake Erie is not a barrier to the dispersal of seeds, but it affects differently the climate of places on its different sides, making each different from the others and different from that of places lying in the same latitude, but not near the lake. The south shore is protected from north winds, and receives the full benefit of those from the opposite direction,

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[1] Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska.